Letter

Use of the Smart Phone as a Diagnostic Interface for Detecting Severe Retinopathy of Prematurity: A Pilot Study

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Dear Editor,
We would like to report a pilot study to establish the use of smart phone as a diagnostic tool for detecting severe retinopathy of prematurity (ROP) compared to digital wide-field photographic images.

ROP is fast emerging as an important cause of childhood blindness in India.[1-3] In spite of recommendations for screening of preterm babies to rule out ROP,[4] there is no evidence of universal ROP screening programs in India. Lack of awareness and limited trained manpower are important barriers in implementing screening programs for ROP. Assigning the task of performing retinal photography to a trained technician and implementing telemedicine models for ROP screening are methods that can be used to overcome these barriers.

In 2012, a hospital-based observational study was conducted at a tertiary eye care center in Pune, West India, after approval from the Institution Ethics Committee. Severe ROP was defined as any ROP in zone I or plus disease or any stage 3 ROP. Poor quality images due to hazy media and patients with non-dilating pupils were excluded from the study. Digital wide-field photography (Retcam Shuttle, Clarity Medical systems, USA) was performed by a trained ophthalmic technician. The images were uploaded on a server using a unique software (i2i CARE Tele Ophthalmology Software, i2i Telesolutions Pvt. Ltd., Bangalore, India). These images could be viewed on a smart phone using a viewer software. Two ophthalmologists experienced in ROP diagnosis and management participated in this study.

One ophthalmologist diagnosed severe ROP based on images viewed on Retcam monitor whereas the other diagnosed same images as seen on a smart phone screen. The screen size of the phone was 3.5 inches diagonally and resolution was 960×640 pixels. The sensitivity, specificity, and positive and negative predictive values for smart phone based diagnosis were calculated.

Images of 206 eyes of 103 infants were included in the study. Severe ROP was diagnosed in 27 (13.1%) and 30 (14.6%) eyes using the smart phone and Retcam images, respectively. The sensitivity and specificity of reading images on smart phone were found to be 90% (95% confidence interval [CI]: 85.9–94.1) and 100%, respectively. The positive and negative predictive values were 100% and 98.3% (95% CI: 96.5–100), respectively.

In a study conducted in South India,[5] a similar method of ROP screening along with competency-based training for management decisions was utilized and the diagnostic sensitivity by non-physician graders was reported to be 95.7%. Thus, the high sensitivity of this tool implies that transmitted images captured by a trained technician can be read on a smart phone for diagnosis of severe ROP and can substitute bedside assessment by an ophthalmologist, optimizing utilization of this highly-skilled and scarce resource. Utilizing a technician in ROP screening programs with simultaneous use of readily and easily accessible tools, such as smart phones by ophthalmologists to interpret retinal images, can aid in overcoming barriers of distance and accessibility, especially for Neonatal Intensive Care Unit (NICU) population in rural/semi-urban areas, that would otherwise go unscreened.

Therefore, our study findings suggest that a smart phone can be used as a valid tool for detection of severe ROP in a telemedicine model of ROP screening.

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Conflicts of Interest

There are no conflicts of interest.

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